A Watershed Conditions Report For the State of Kansas

HUC 10270103 (Delaware) Watershed

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Watershed Conditions Report
For
HUC 8 10270103 (Delaware)

Prepared by
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Nonpoint Source Section
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EXECUTIVE SUMMARY

This Watershed Conditions Report is designed to serve as a water quality "atlas", and is intended to provide stakeholders in water quality with a tool to assess the quality of water resources within their watershed. This Huc is primarily drained by the Delaware River and it's tributaries. Surface water quality for HUC 8 10270103 streams and rivers is generally fair to poor with many of the surface water bodies not supporting their designated uses. The primary pollutant concern within HUC 8 10270103 streams and rivers is fecal coliform bacteria (FCB). Fecal coliform bacteria is found in the digestive systems of warm blooded animals. In the environmental coliform bacteria is an indicator of potential disease producing organisms.

Within Huc 10270103 there is one state park, Perry Lake, and several smaller reservoirs and ponds. The primary pollutant concern for lakes within the watershed is eutrophication and atrazine. Eutrophication is a natural process which creates conditions favorable for algae blooms and excess plant growth. This process is often accelerated by excess nutrient loading from the watershed. Atrazine is a chemical used to control the growth of grasses.

Groundwater resources in HUC 8 10270103 include the alluvial aquifers and portions of the Glacial Drift aquifer. Water from these aquifers is generally in good condition with naturally occurring minerals and ammonia and manganese as the primary pollutant concerns.

PURPOSE

The Watershed Conditions Report is designed to serve as a water quality "atlas" for a given watershed, and is intended to provide Watershed Stakeholders Committees (WSC) with a tool to assess the quality of water resources within their watershed.

BACKGROUND

The Clean Water Act mandated that States assess the quality of their waters and implement Total Maximum Daily Loads (TMDLs) for water bodies that do not meet their designated uses. The following is a summary of steps taken by the State of Kansas to comply with these requirements of the Clean Water Act.

The Kansas Department of Health and Environment (KDHE) prepared the Kansas Unified Watershed Assessment in 1998. This assessment classifies the State's watersheds into four categories. A Category I classification means the watershed is in need of restoration due to having water quality impairments or degradation of other natural resources related to an aquatic habitat, ecosystem health and other factors related to aquatic life resources. Category II are watersheds in need of protection. Category III are watersheds with pristine or sensitive aquatic system conditions on lands administered by federal, state, or tribal governments. Category IV watersheds are those for which there is insufficient data to make accurate classification. KDHE then assigned a restoration priority score to each Category I watershed.

As mandated by section 303(d) of the Clean Water Act, Lakes and streams within the Category I watersheds, which do not meet water quality standards, are published biannually in the 303(d) list. Subsequently, lakes and streams which appear on the 303 (d) list are scheduled to have a Total Maximum Daily Loads (TMDL) prepared. KDHE is currently preparing TMDLs for impaired stream segments located within the highest restoration priority watersheds.

To restore water quality within the Category I watersheds, KDHE recommends the implementation of a Watershed Restoration and Protection Strategy (WRAPS). The ultimate goal of the WRAPS process is to create and implement a plan to restore the health of water bodies that do not meet their water quality standards. Additionally, the WRAPS process will insure that water bodies that currently meet their water quality standards are protected.

KDHE recommends that the WRAPS process be implemented on a local level by a Watershed Stakeholders Committee (WSC). The WSC would have the responsibility of working with local and state agencies to develop a WRAPS plan. This plan should identify the following: public outreach methods; required monitoring activities based on water quality goals and outcomes; specific water quality problems; watershed coordinator/evaluator; actions to be taken to achieve water quality goals and outcomes; schedule for implementation of needed restoration measures; and funding needs.

Streams and Rivers

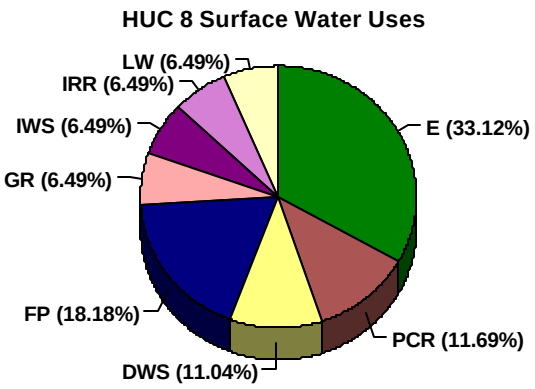
HUC 8 10270103

The Huc 8 10270103 watershed is ranked third in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, approximately 52% percent of the total miles of water in this watershed do not meet their designated uses. The Delaware River, Elkhorn Creek, Brush Creek, and Muddy Creek are among the larger streams and rivers. See Attachment 1 for a map of streams and rivers in HUC 8 10270103.

Designated Uses

There are approximately 22 public water supplies within the watershed. According to the Kansas Surface Water Register, the most common designated use for streams and rivers in this watershed include: expected aquatic life uses, food procurement and contact recreational use.

Figure 1



- S=Special Aquatic Life Use Water
- E=Expected Aquatic Life Use Water
- FP=Food Procurement
- DWS=Designated for domestic water supply
- GR=Designated for ground water recharge.
- LW=Designated for livestock watering use.
- IWS=Designated for industrial water supply
- IRR=Designated for irrigation use.
- PCP=Primary contact recreation.

TMDL/Contaminate Concerns

Streams and rivers throughout Kansas have been sub-divided into segments. By dividing the streams and rivers into segments they can be better analyzed and understood. A reach of river or stream may have segments which vary greatly in water quality, based on surrounding land uses. The figures below display the impairments of the streams and rivers based on the number of segments sampled.

Surface waters not meeting their designated uses require total maximum daily loads (TMDLs). Figure 2 shows that 47% of the stream/river segments sampled are impaired and required TMDLs. The primary pollutant concern for this watershed's streams and rivers is fecal coliform bacteria (FCB) and ammonia (NH3). Figure 3 shows that 92% of the impaired stream/river segments are impaired by FCB and 8% by ammonia. Fecal coliform bacteria is a bacteria present in human and animal waste. It serves as an indicator of potential disease causing organisms. Ammonia is a chemical that is toxic to fish and other aquatic organisms.

Figure 2

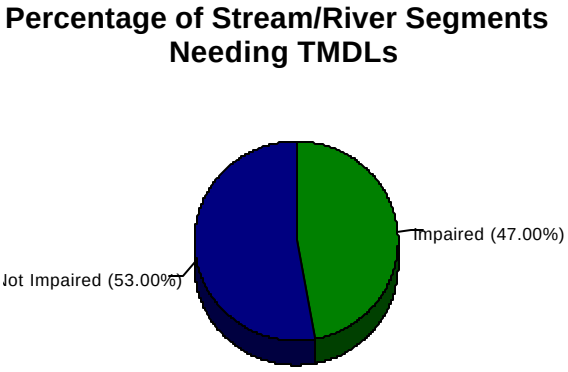
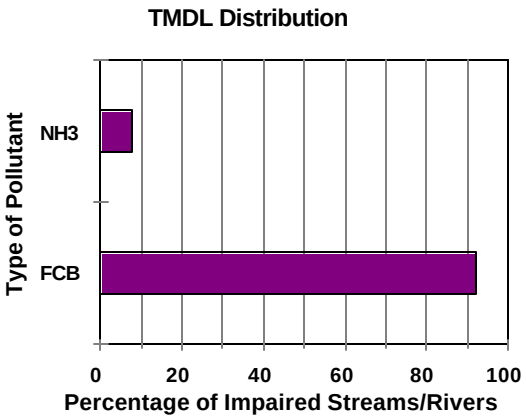


Figure 3



Potential Pollution Sources

Potential sources of FCB contamination include feedlots, wastewater treatment facilities, septic systems, and wildlife. Potential sources of Ammonia are livestock, septic tanks, fertilizer, municipal and industrial waste.

Analyzing the land uses within this watershed helps to understand which land uses might have greater influences on the source of the impairments. Below is a list of the land uses in this watershed. Grassland is considered grazingland for livestock.

- Urban Area.... .4%
- Row Crop....32%
- Grassland....58.5%
- Wooded Area....7.5%
- Water Area....2.2%
- Other.... .02%

Feedlots: In the State of Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 166 registered CAFOs located within HUC8 10270103 (this number, which is based on best available information, may be dated and subject to change). Waste disposal practices and waste water effluent quality is closely monitored by KDHE for these registered CAFOs. Because of this monitoring, registered CAFOs are not considered a significant threat to water resources within the watershed. A portion of the State's livestock population exists on small unregistered farms. These small unregistered livestock operations may contribute a significant source of fecal coliform bacteria and nutrients, depending on the presence and condition of waste management systems and proximity to water resources.

Wastewater Treatment Facilities: There are approximately 31 municipal and industrial wastewater treatment facilities within the watershed (this number may be dated and subject to change). These facilities are currently regulated by KDHE under National Pollutant Discharge Elimination System (NPDES) permits. These permits specify the maximum amount of pollutants allowed to be discharged to the "waters of the State". Due to the chlorination processes involved in municipal waste treatment, these facilities are not considered to be a significant source of fecal coliform bacteria; however they may be a significant source of nutrients.

Septic Systems: There are currently thousands of septic systems within the watershed and this number is increasing. When properly designed, installed, and maintained, septic systems can act as an effective means of wastewater treatment. However, poorly maintained or "failing" septic systems can leach pollutants into nearby surface waters and groundwater. The exact number of failing septic systems within the watershed is unknown; however the number may be increasing due to the current trends in suburban development. Local Environmental Protection Programs and county health departments provide excellent sources of information regarding the proper design, installation, and maintenance for septic systems.

Wildlife: Wildlife located throughout the watershed are not usually considered a significant source of Nonpoint source pollutants. However, during seasonal migrations, concentrations of waterfowl can add significant amounts of fecal coliform bacteria and nutrients into surface water resources.

Row Crop Agriculture: As stated above, approximately 32% of the watershed's land is used for row crop agriculture. Row crop agriculture can be a significant source of nonpoint source pollution. Common pollutants from row crop agriculture include sediment, nutrients, pesticides, and fecal coliform bacteria. Many producers within the watershed regularly implement and maintain BMPs to limit the amount of nonpoint source pollutants leaving their farm. Some common BMPs include: the use of contour plowing; use of cover crops; maintaining buffer strips along field edges; and proper timing of fertilizer application.

Lakes & Wetlands

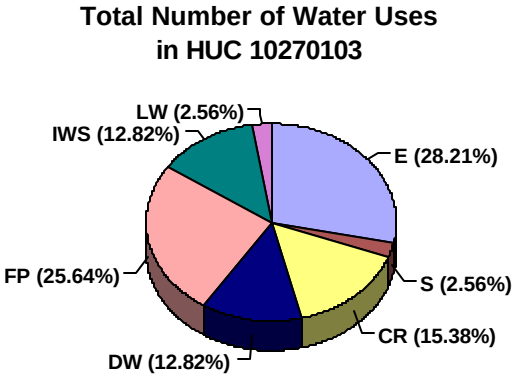
Huc 8 10270103 is home to Perry Lake, Atchison City Park Lake, Lake Jayhawk, and several smaller city and county lakes along with two wetlands. Perry Lake is a several thousand acre reservoir located in Jefferson County. It is used for recreational purposes with 124 camp sites, a large marina for fishing, and a sanded beach area for swimming. The two wetlands are located in Atchison and Jefferson County. See Attachment 2 for a map of lakes in HUC 8 10270103.

Designated Uses

The majority of the lakes in this watershed are designated for aquatic life use, food procurement, industrial water supply, and recreational purposes.

Figure 4

- E=Expected Aquatic Life Use
- S=Special Aquatic Life Use
- CR=Designated for contact recreational use.
- DW=Designated for domestic water supply use.
- FP=Food Procurement
- LW=Designated for livestock watering use.
- IWS=Designated for industrial water supply.



TMDL/Contaminate Concerns

Surface waters not meeting their designated uses require total maximum daily loads (TMDLs). As shown below in Figure 5 about 30% of the lakes/wetlands in this watershed are impaired and require TMDLs. The primary pollutants for this watershed's lakes and wetlands are eutrophication (E) and atrazine(ATR). Figure 6 shows that of the impaired lakes sampled, 66% are impaired by eutrophication and 34% by atrazine. Eutrophication is caused by excess nutrients from a variety of nitrogen and phosphorous sources including row crop agriculture, feedlots, septic systems, and urban/suburban runoff. Atrazine is a common herbicide used to control grasses in corn and grain sorghum.

Figure 5

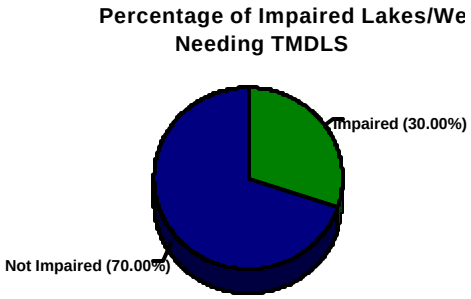
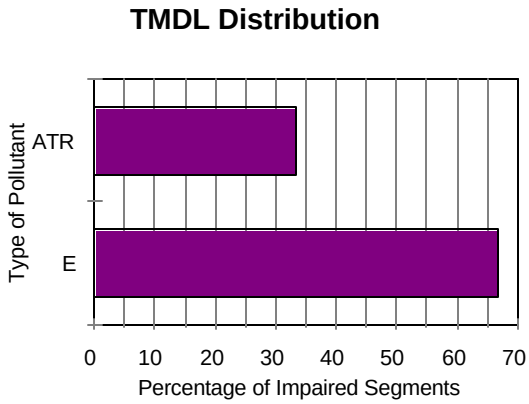


Figure 6



Potential Pollution Sources

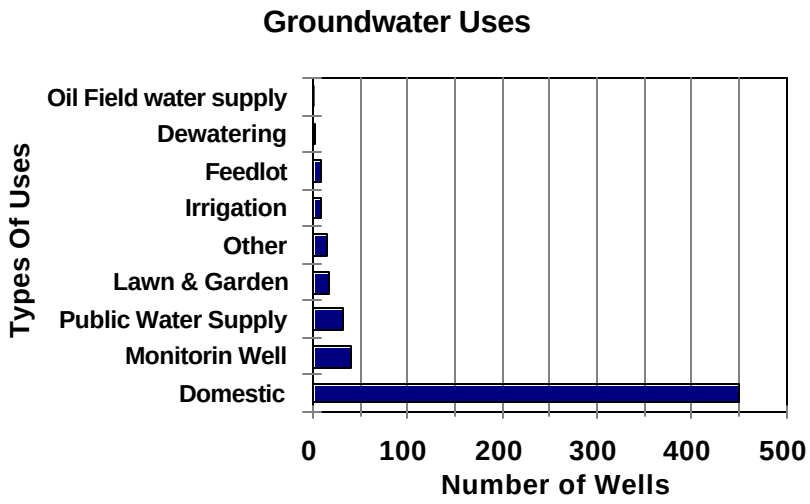
Based on the watershed's land use percentages, the primary pollutant source for nutrients would be row crop agriculture. Additionally, feedlots, septic systems, waste water treatment plants and urban/suburban runoff may contribute significant amounts of nutrients into the watershed.

Groundwater

Major groundwater aquifers underlying this watershed include portions of the Glacial Drift and Alluvial aquifers of the Delaware River and it's tributaries. See attachment 4 for a map of groundwater aquifers within this watershed.

Designated Uses

There are approximately 577 groundwater wells located within the watershed. As shown below, water from these wells is used for domestic use, groundwater monitoring, public water supply, and lawn and garden.



Aquifer Characteristics

Glacial Drift Aquifer: Portions of the Glacial Drift aquifer exist in the northwest portion of the watershed. Water from this aquifer is often used for rural domestic water supply. Historically, water from this aquifer is very hard with nitrates being one of the primary pollutant concerns.

Alluvial Aquifer: Alluvial aquifers of the Kansas River and its tributaries exist throughout the watershed. Alluvial aquifers provide the primary water source for many public water supplies located within the watershed. Water quality in alluvial aquifers is generally good; however nitrates, minerals, pesticides, and bacteria can be pollutant concerns.

Potential Pollution Types and Sources

Common groundwater pollutants include: nitrates, chloride, sulfates, bacteria and atrazine. Nitrate impaired groundwater is perhaps the most prevalent groundwater contamination problem in the State.

Chloride: Chloride is a naturally occurring mineral found in Kansas lakes, streams, and groundwater. In high concentrations, chloride can cause deterioration of domestic plumbing, water heaters, and municipal water works. The primary source of chloride impacted groundwater is intrusion of salt water from deeper formations, often due to improperly constructed water wells which allow confined aquifers to come into contact with each other.

Nitrate: Nitrate is a naturally occurring compound and is an essential component of all living matter. However, high concentrations of nitrate in drinking water can cause adverse health effects including "blue baby" syndrome. Sources of nitrate include municipal waste water treatment plant discharges, runoff from livestock operations, leaching of fertilizer from urban and agricultural areas, and failing septic systems.

Sulfates: Sulfate is a naturally occurring mineral that can cause taste and odor problems in drinking water. Sulfates are dissolved into groundwater as the water moves through various sulfur containing rock formations.

Bacteria: Fecal coliform bacteria are found in the digestive systems of warm blooded animals. In the environmental coliform bacteria is an indicator of potential disease causing organisms. Potential sources of bacteria contamination in groundwater include livestock facilities, septic systems, pets, and wildlife. Many wells are impacted by bacteria due to improper construction which allows water from the surface to funnel directly into the well.

VOCs: Volatile Organic Compounds, also called purgeable organics, are components of fuels and solvents. They are ingredients in many household and industrial products. Sources of VOCs are leaking fuel storage tanks, trash dumps, and some agricultural pesticides.

Iron: Iron is a naturally occurring element found in the soil throughout Kansas. It is an annoyance as it has an objectionable taste, causes a red stain to porcelain fixtures and laundry, and causes plumbing irritations.

Manganese: Manganese is a naturally occurring element and causes an unpleasant taste in drinking water, stains porcelain and laundry, and collects deposits in plumbing. It is naturally occurring throughout the soils in the state.

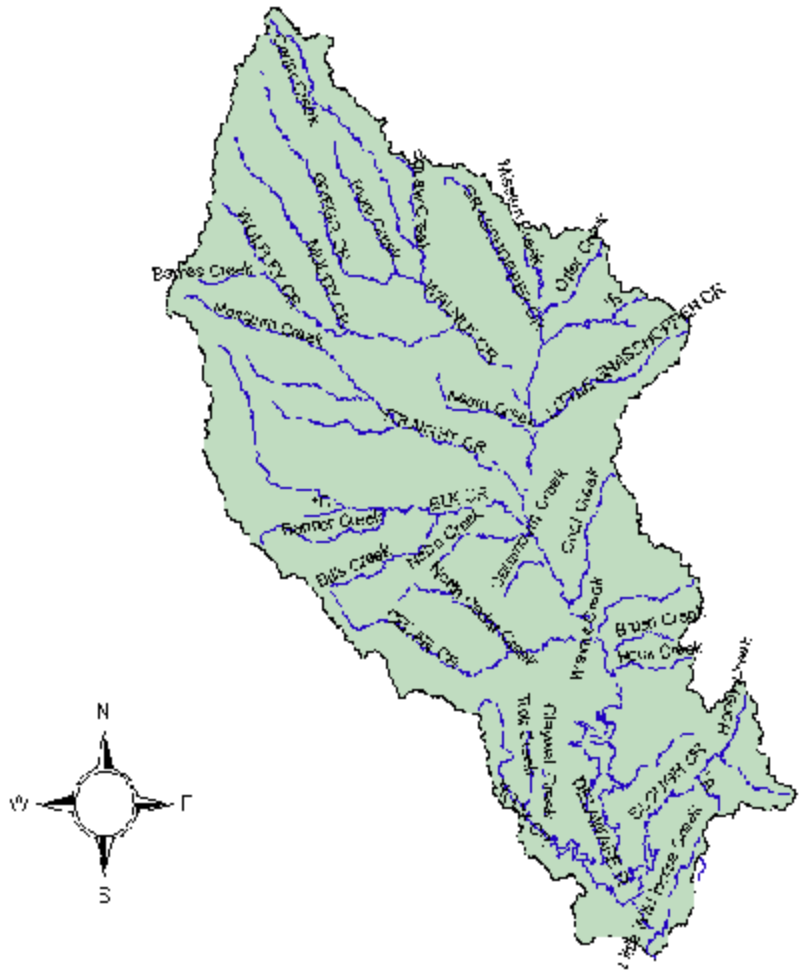
Ammonia: Ammonia is a chemical which is toxic to fish and aquatic organisms. Sources of ammonia are livestock, septic tanks, fertilizer, municipal and industrial waste.

TSS: TSS stands for Total Suspended Solids which are particles such as soil, algae, and finely divided plant material suspended in water. Sources of TSS are soil erosion from cropland, stream banks, or construction sites, and municipal and industrial waste.

Attachment 1

Maps

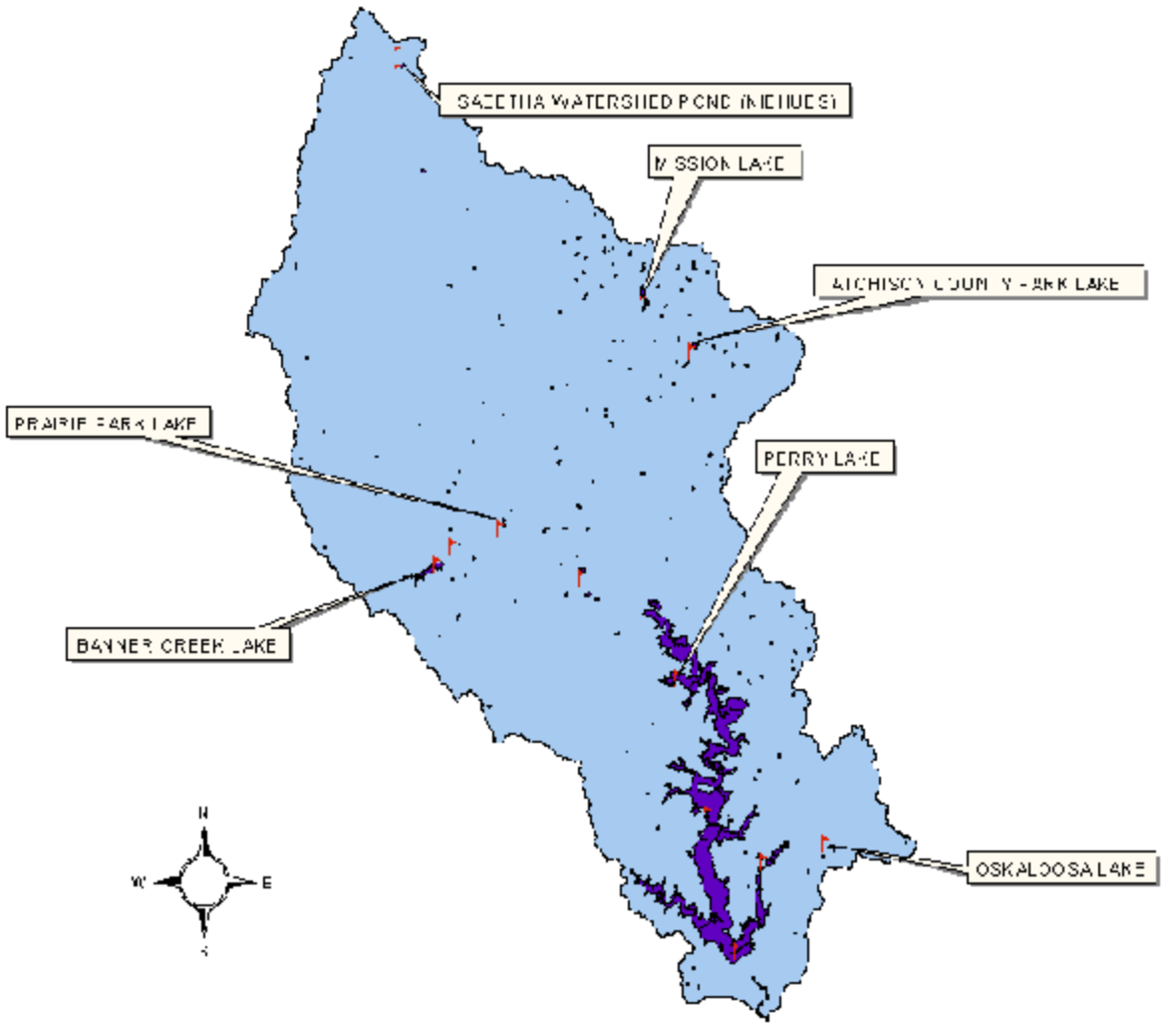
Huc -10270103- Delaware Streams & Rivers



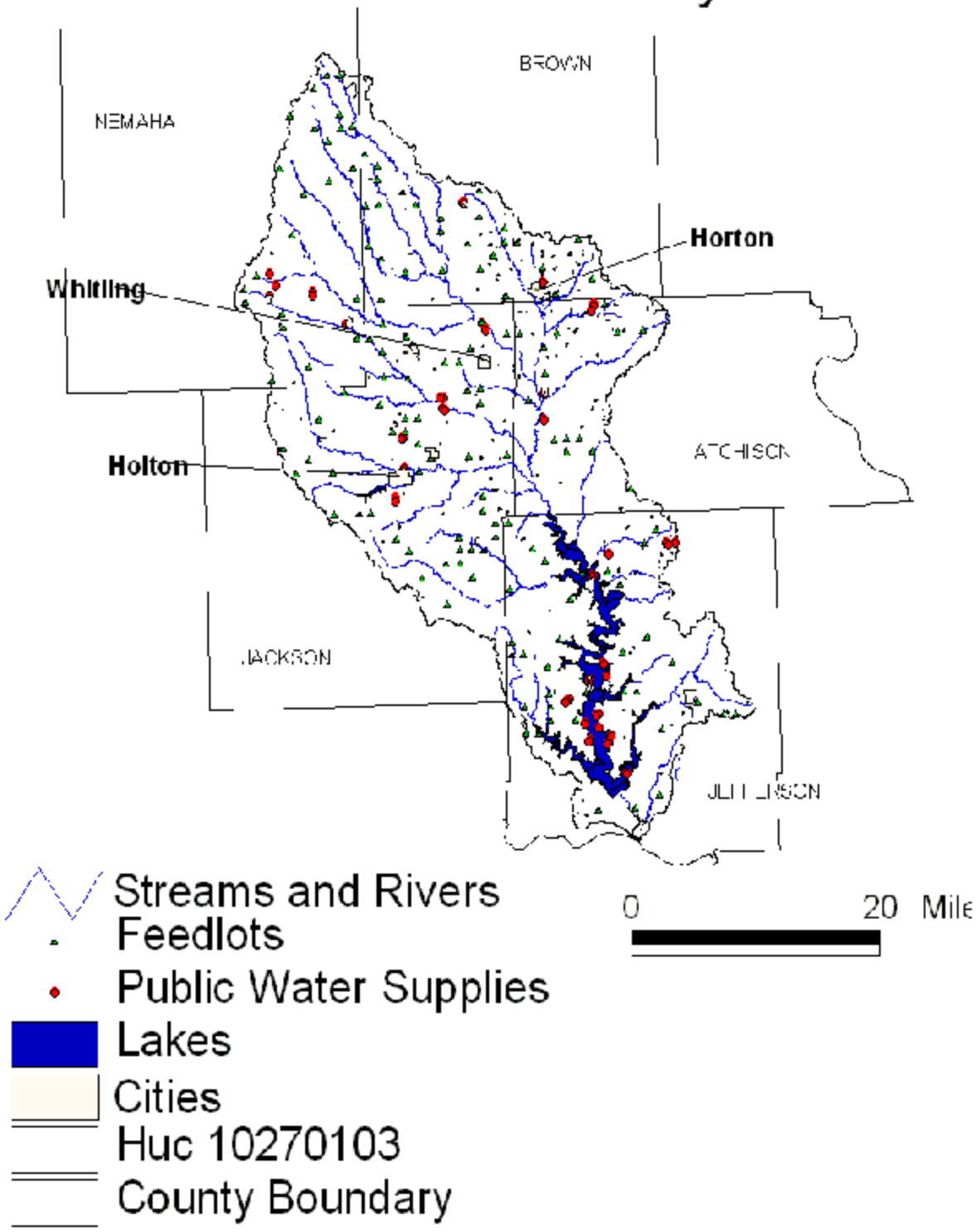
20 0 20 40 Miles

Streams and Rivers
Huc 10270103

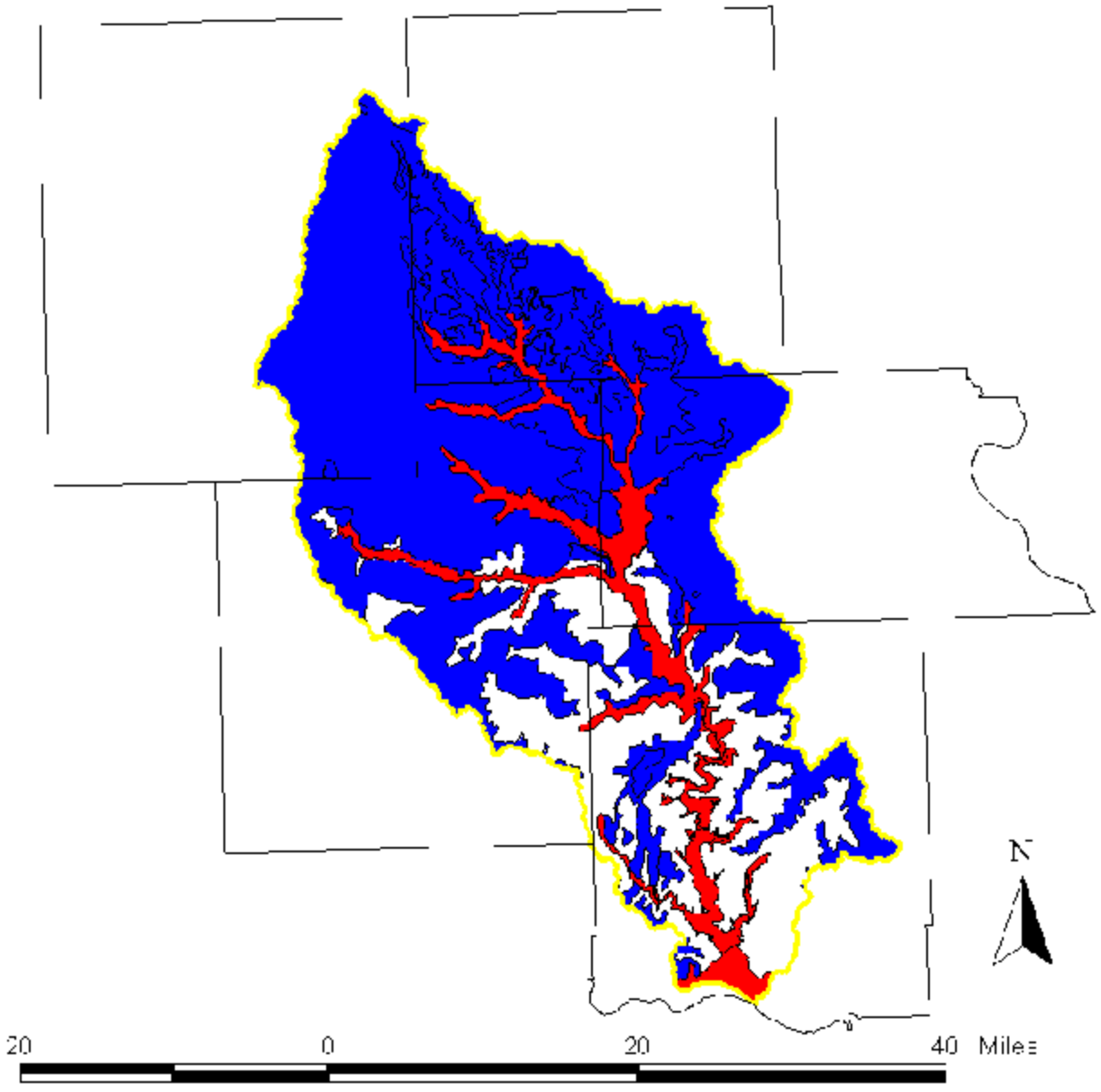
Huc 8 -10270103- Delaware
Lake Monitoring Sites



Huc 8 -10270103- Delaware Watershed Boundary



Huc 8 10270103 Delaware Groundwater Aquifers



County Boundary
Watershed Boundary
Alluvial Aquifer
Glacial Aquifer

ODHE
Bureau of Water
19 November 2001
James Zioconis